
Eco-Enzyme-A Perfect House-Hold Organic Cleanser

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Introduction

Enzymes are protein chains that bring about biochemical reaction which is essential to help increase metabolism in our body. Another important property of enzyme is that they breakdown water-insoluble dirt into smaller molecules. This makes them a perfect cleaning agent. There are lot of “enzyme cleaners/detergents” commercially sold in the market.

The eco-enzyme prepared is a complex solution produced by fermentation of fresh kitchen waste (fruit and vegetable dregs), sugar (brown sugar, jaggery or molasses sugar) and water. It is dark brown and has a strong sweet sour fermented scent. Eco enzyme is a multipurpose liquid and its applications cover household, agriculture, animal husbandry etc.

The enzyme prepared can be used as an excellent process for waste management. This is a quite simple and an easy process to decompose biodegradable materials by micro-organisms in a series of processes. The resulted filtrate obtained is rich in amino acids and acetic acid. Hence it can be used widely as a cleanser or a fertiliser. The usual household cleanser generally contains a lot of hazardous chemicals, such as phosphate, nitrates, ammonia, chlorine etc. The accumulation effect of these chemicals released from every household can cause significant damage to the planet earth. Eco-enzyme will be the household helper: general cleaner, air purifier, insect repellent, laundry cleaner, car care, organic fertiliser etc. It can reduce pollution and save money. The eco-enzyme will be a natural household cleaner; detergent; car care; fabric softener; organic fertiliser, etc. It has anti-bacterial, anti-fungal and anti-viral properties and is a natural antiseptic for our homes. Eco-enzyme will help reduce over-use of chemicals in the agriculture. It will keep the farm free from infections and insects. The process which leads to the production of eco-enzyme is a combination of series of processes. Generally the biomaterials to be digested are shredded to increase the surface area. The first step is Hydrolysis, where it is hydrolysed to produce simple sugars, amino acids, and fatty acids. Hydrolysis is followed by acidogenesis –when it is broken down by acidogenic bacteria into simpler molecules, volatile fatty acids (VFAs) and produces ammonia, CO₂ and H₂S as byproducts. In the next step, acetogenesis, the simple molecules from acidogenesis are further digested by acetogen bacteria to produce CO₂, H₂ and acetic acid. The final step is methanogenesis – where methanogen bacteria produce methane, CO₂ and water.

Preparation of Eco-Enzyme

Procedure:

- ❖ Take an air-tight plastic container. Do not use glass or metal containers that do not allow expansion caused by gas released during the fermentation process of enzyme.
- ❖ Dilute sugar (1 part) in water (10 parts); follow by adding your kitchen waste (3 parts). Use only fruit and vegetable dregs. Avoid oily cooked food, fish or meat residues (make those your garden compost materials). To make fresh smelling enzyme, add orange/lemon peel or pandan leave etc.
- ❖ Leave some air space for fermentation.
- ❖ Make sure the container is air-tight.
- ❖ During the first month, gases will be released during fermentation process. Release the pressure built up in the container to avoid rupturing.
- ❖ Push the floating dregs downward every once in a while.
- ❖ Place at cool, dry and well ventilated area. Avoid direct sunlight. Let it ferment for at least 3 months before use. Filter and it is ready to use.

- ❖ After 3 months, extract out the water and leave only the sediment. The sediment can be dried to become fertilizer or may leave it for next fermentation.



Fig.1. Synthesis of Eco-Enzyme.

Applications of Eco-Enzyme

(I) Washing of Fruits and Vegetables:

- ✓ Add 2 teaspoons of eco-enzyme in 1 liter of water.
- ✓ Soak the vegetables or fruits for about 45 minutes to wash the layer of pesticides, fertilizers herbicides, chemicals, heavy metals, bacteria and parasitic ova on them
- ✓ They will taste better after being soaked.

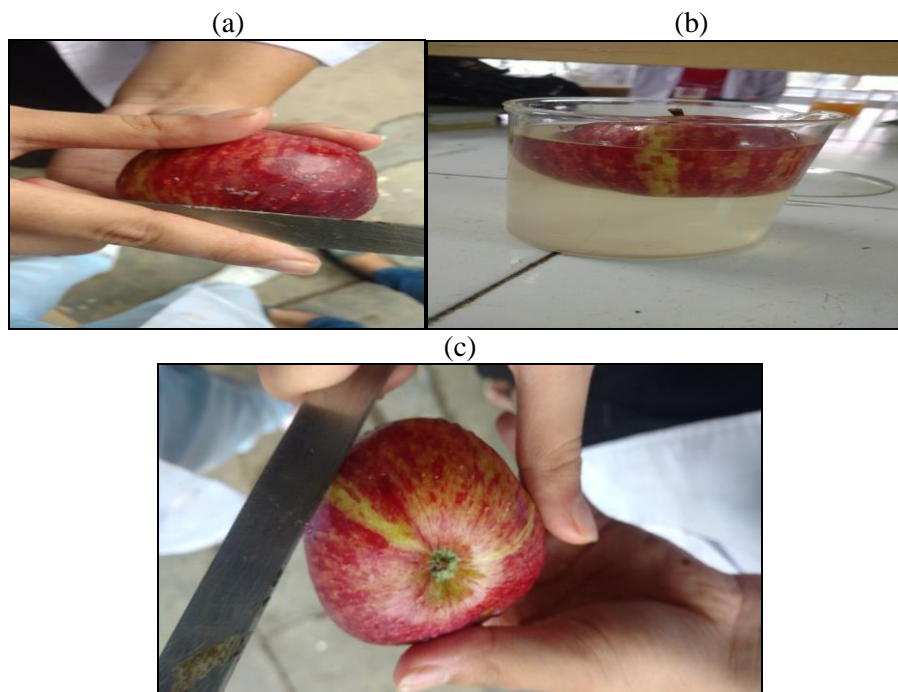


Fig.2. (a) Coating of wax on an apple; (b) apple soaked in Eco-Enzyme solution and (c) Removal of wax layer on the apple due to soaking in eco enzyme.

(II) Cleaning of Pond Water:

- ✓ Collected a sample of pond water in a beaker containing greasy and oily layers.
- ✓ Poured eco-enzyme cleanser on the sample.
- ✓ After few seconds the oil layer separating along with bubble formation.
- ✓ The sample was left undisturbed. After 10-15 minutes the oil layer started disappearing.
- ✓ Same procedure was carried out for 2 weeks and the sample was observed to be clearer than its initial stage.



Fig.3. Representation of cleaning of pond water using synthesized Eco-Enzyme.

(III) Removal of Stain on Clothing Materials:

- ✓ Took oil stained cloth.
- ✓ Poured the eco-enzyme cleanser on the stained portion and gently rubbed the cloth.
- ✓ After few seconds the stain started disappearing and soon the cloth was stain free.



Fig.4. Removal of stain on clothing material using synthesized Eco-Enzyme.

(IV) Cleaning of Dirt Deposition on Shoes:

- ✓ Firstly, shoes containing dirt are taken. The shoes need be dirty enough to get visible results.
- ✓ The eco-enzyme mixture is taken in a small vessel and then applied slowly on the required part of the shoe that needs to be cleaned.
- ✓ Dip the shoe lace in a small beaker containing eco-enzyme mixture and keep it still for some time.
- ✓ After constantly applying the eco-enzymes on a pair of shoes and its lace, the dirt starts to vanish away and the shoe appears to be cleaned,
- ✓ Using an eco-enzyme is an effective way to clean shoes containing mud and dirt (Fig.5.).



(a) Before



(b) After

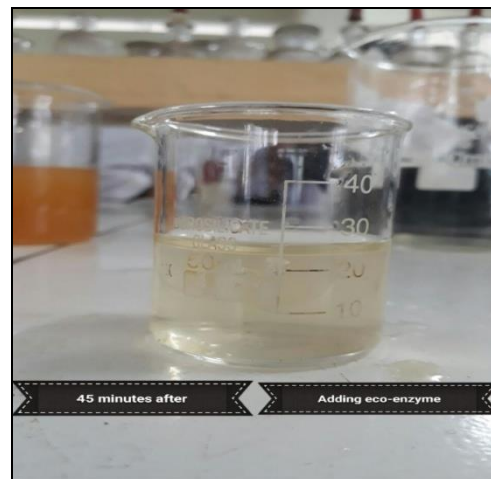
Fig.5. Removal of dirt deposition on shoes using synthesized Eco-Enzyme.

(V) Sewage Water Treatment:

- ✓ Water sample is taken in a beaker and few drops of dish wash is added.
- ✓ No change is observed.
- ✓ Then few drops of Eco enzyme are added to sample.
- ✓ It is made to stand for 45 minutes.
- ✓ After 45 minutes water sample gets treated as shown in pictures (Fig.6.).



(a) Before



(b) After

Fig.6. Representation of sewage water treatment using synthesized Eco-Enzyme.

SIGNIFICANCE OF THE STUDY:

- This is a well-established process for waste management
- This is quite simple and an easy procedure to decompose biodegradable materials by micro-organisms in a series of processes.
- Resulted filtrate is rich in amino acid and acetic acid.
- Hence it can be used widely as a cleanser or a fertiliser.
- The usual household cleanser generally contains a lot of hazardous chemicals, such as phosphate, nitrates, ammonia, chlorine etc. The accumulation effect of these chemicals released from every household can cause significant damage to the planet earth.
- Eco-enzyme will be the household helper: general cleaner, air purifier, insect repellent, laundry cleaner, car care, organic fertiliser etc. It can reduce pollution and save money.
- The eco-enzyme will be a natural household cleaner; detergent; car care; fabric softener; organic fertiliser, etc. It has anti-bacterial, anti-fungal and anti-viral properties and is a natural antiseptic for our homes. Eco-enzyme will help reduce over-use of chemicals in the agriculture. It will keep the farm free from infections and insects.

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